

Appl. No. 09/453,055
Amndt. Dated Nov. 7, 2003
Resp. to Office Action dated July 8, 2003

REMARKS/ARGUMENTS

Reconsideration is respectfully requested of the Official Action of July 8, 2003, relating to the above-identified application.

A request for a one month extension of time, as well as the associated fee, is enclosed.

In an effort to expedite prosecution of this application, Claims 10 and 18-23 have been deleted, without prejudice. New Claims 24-29 are presented in order to make certain that all aspects of applicants' invention are adequately defined in the claims.

With entry of the foregoing amendment, the claims in the application are:

2, 16,17 and 24-29.

All claims have now been amended to define the thermosetting sealing material with the transitional phrase "consisting of" to thereby exclude the use of a prepreg material. Also, the claims specify that the heating of the sealing material and the dry fabric up to the curing temperature of the sealing material takes place at a rate of 1°C per minute or less. The basis for this limitation is found in the application, for example, on page 8, last paragraph.

As explained in the application, for example, beginning on page 3, the method of the invention provides for forming a honeycomb sandwich composite panel in which the honeycomb core is sealed in a mold prior to resin impregnation in order to prevent the resin from flowing into the cells of the honeycomb core during the resin impregnating operation. This results in a lighter weight honeycomb composite panel and is, therefore, an improvement in the technology, particularly relating to aircraft structures where weight is an important factor. Thus, by avoiding

the structures where the honeycomb is saturated or contains unwanted resin which results in a heavy composite, applicants' invention overcomes this problem and enables the production of lightweight honeycomb sandwich composite panels even without the use of prepregs which are required in accordance with the teachings of the prior art.

Clearly, the elimination of the prepreg in accordance with applicants' invention results in lower material costs and a reduced number of operations.

Applicants' method enables the formation of a honeycomb core for the production of a composite panel where the dry fabric is stacked on both sides of the honeycomb core with a thermosetting sealing material having a special adhesive property placed in between. Then the sealing material and the dry fabric are heated at the curing temperature of the sealing material at a rate of 1°C per minute or less, thereby causing initial hardening of the sealing material and to dry the fabric. After that, the honeycomb core is sealed and the leakage of resin into the cells of the honeycomb core during the subsequently carried out resin impregnation operation is prevented.

In applicants' invention there are two critical steps. The first involves stacking the thermosetting sealing material on at least one side of the honeycomb core where the sealing material consists of a resin film or plurality of resin films. The additional component is glass microspheres, as pointed out in Claim 2. Thereafter, the hardening of the sealing material is carried out at a curing temperature of the sealing material at a rate of 1°C per minute or less and then subsequently, after the honeycomb core is sealed to prevent leakage, the product is

impregnated with a thermosetting resin, thereafter hardening the resin impregnated into the dry fabric.

In accordance with this procedure, it is possible to produce a lightweight composite and avoid the problem of the leakage of the thermosetting resin into the honeycomb core without the use of a prepreg.

The new claims presented herewith, as well as amended Claim 2, are intended to more clearly point out the foregoing aspects of applicants' invention.

According to the *Handbook of Composites* by Lubin, of record herein, a prepreg is recognized in the industry as meaning "ready-to-mold material in sheet form which may be cloth, mat, or paper impregnated with resin and stored for use. The resin is partially cured to a "B" stage and supplied to the fabricator who lays up the finished shape and completes the cure with heat and pressure." See, page 771 of the Glossary in the Lubin reference book. The definition of prepreg is incorporated herein by reference and shows what persons skilled in the art would recognize by the term "prepreg". Applicants respectfully submit that the claims as presented herewith exclude the prepreg as defined in the Lubin publication and as recognized as representing the state of the art and the authentic definition of the term "prepreg".

The rejection of the claims in this application as allegedly obvious under 35 U.S.C. §103(a), in view of *Cundiff* (US 5,567,499) taken with *Lubin* (The Handbook of Composites), *Fellmann*, *Ahrens*, *Browne* and the European patent 588,436 is traversed and reconsideration is respectfully requested.

The *Cundiff* patent, as acknowledged by the Examiner, teaches a method for resin transfer molding (RTM) in connection with making a honeycomb core sandwich composite panel. Claim 1 of *Cundiff* shows the structure of the final product where 12 indicates the central honeycomb core number, 14a and 14b constitute the cured adhesive film, 16a and 16b constitute the prepreg material, and 18a constitutes the cured layer formed of the fibers which have been impregnated with the RTM resin. It is acknowledged in the Official Action that *Cundiff* does not disclose or teach that a prepreg can be eliminated. Neither does *Cundiff* show how to avoid the use of prepreg materials. Indeed, the use of prepreg materials constitutes the state of the art as revealed by the collection of references listed in the Official Action.

None of these references disclose, teach or suggest the elimination of prepreg materials.

The Official Action relies, in particular, on the European patent, pages 2 and 3, for allegedly showing the substitution of a material known as Syncore, which is indicated as being a syntactic foam in the form of a composite material consisting of microspheres and resin.

Notwithstanding the disclosure on pages 2 and 3 of the European patent, applicants invite attention to page 7, at line 25, which states, "a typical embodiment of the invention comprises not only the syntactic foam, but also a prepreg and/or honeycomb component. It is clear that the syntactic foam is used in combination with the conventional prepreg layers. Thus, the European patent, contrary to what is implied in the Official Action, does not disclose a composite which excludes prepreg layers.

The issue in this application, therefore, comes down to whether or not the prior art suggestions the elimination or total replacement of prepreg layers. A review of the references and a careful consideration of what the references teach clearly indicates that there is no appreciation in the prior art as represented by the references of record that a prepreg material can be totally eliminated.

Applicants have made an earnest effort to amend the claims to positively exclude the use of prepreg materials. Therefore, it will be noted that Claim 2 specifies that the thermosetting sealing material consists of a resin film and glass microspheres. No mat, fabric or other type of material which, according to the *Lubin* reference, constitutes the typical components of a prepreg are defined or encompassed by the language in Claim 2. Similarly, Claim 24 specifies that the thermosetting sealing material consists of a plurality of epoxy resin adhesive films and a carry material used as an adhesive film thereby excluding the prepreg material. Finally, new Claim 26 specifies the thermosetting sealing material consists of epoxy adhesive resin films and an epoxy resin film placed between the epoxy films. Claim 28 specifies that the thermosetting sealing material sealing material consists of at least three epoxy resin adhesive films. Thus, it is respectfully submitted that the claims clearly exclude a prepreg material as that term is understood in the industry.

For the reasons set forth above, and in view of the amendment filed herewith, it is respectfully submitted that the references relied on in the Official Action do not create *prima facie* obviousness of the claimed invention.

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With regard to the rejection under 35 U.S.C. § 112 of Claims 2, 10 and 16-18, it should be noted that Claims 2 and 16 now have been amended to clarify the uncertainty referred to in the Official Action. The other claims are cancelled and, therefore, the rejection should be overcome.

In view of above, Applicants request favorable action at the Examiner's earliest convenience.

Respectfully submitted,

SMITH, GAMBRELL & RUSSELL, LLP

By: 
Robert G. Weilacher, Reg. No. 20,531

Suite 3100, Promenade II
1230 Peachtree Street, N.E.
Atlanta, Georgia 30309-3592
Telephone: (404) 815-3593
Facsimile: (404) 685-6893